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JOINT COMMITTEE ON ATOMIC ENERGY

REPORT OF THE MEMBERS OF THE JOINT COMMITTEE ON ATOMIC ENERGY ON THE FIRST GENERAL CONFERENCE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY AND VISITS TO ATOMIC ENERGY CENTERS IN WESTERN EUROPE

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NOTE.—Craig Hosmer was appointed January 15, 1958, to fill a vacancy created by the resignation of Sterling Cole, who resigned from Congress December 1, 1957, to accept position of Director General of the International Atomic Energy Agency. Wayne N. Aspinall was appointed March 17, 1958, to fill the vacancy created by the death of John J. Dempsey.

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REPORT OF THE MEMBERS OF THE JOINT COMMITTEE ON ATOMIC ENERGY ON THE FIRST GENERAL CONFERENCE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY AND VISITS TO ATOMIC ENERGY CENTERS IN WESTERN EUROPE

In September and October 1957, members of the Joint Committee on Atomic Energy attended the First General Conference of the International Atomic Energy Agency, in Vienna, Austria, and visited other cities and laboratories in Western Europe in order to learn of developments in those countries concerning the peaceful uses of atomic energy. The countries visited, besides Austria, by some or all of the members making the trip included England, Germany, France, Belgium, Denmark, Greece, Italy, Sweden, and Russia. In order that the Congress and the public may be informed of the places and laboratories visited, and of the meetings and briefings in which the members of the Joint Committee participated, this report and its appendixes have been prepared.

The members of the Joint Committee who participated in the Vienna conference or in the inspection of the Western Europe atomic energy centers were as follows: Hon. Carl T. Durham, chairman; Representatives Chet Holifield, Melvin Price, John J. Dempsey, W. Sterling Cole, James E. Van Zandt, and James T. Patterson; and Senators John O. Pastore, Albert Gore, and Bourke B. Hickenlooper.

I. THE FIRST GENERAL CONFERENCE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY

The creation of the International Atomic Energy Agency was an historic event. All members of the Joint Committee who were able to attend participated either as members of the United States delegation or as congressional advisers to the United States delegation.

The committee arrived in Vienna on Sunday, September 29, 1957, and the following morning received a briefing at the United States Embassy by Mr. Lewis L. Strauss, the Chairman of the Atomic Energy Commission and the head of the United States delegation to the Conference, Mr. Robert McKinney, serving as the head of the permanent United States delegation, and Ambassador Wadsworth and staff. On the following day the members attended the opening session of the Conference and listened to the statements presented to the Conference by the delegates from many of the principal countries, including the United States, the United Kingdom, France, Canada and the Soviet Union.

The members of the Joint Committee participated during the first week of the Conference in the meetings of the United States delegation which were generally held beginning at 9 a. m. daily, and in the meetings of the General Conference held later in the morning and in the afternoon. While in Vienna, some of the members of the committee

also visited and inspected the Hungarian refugee camps, and also traveled to the Hungarian border to observe the military fortifications and Iron Curtain at that point.

After the conclusion of the first week of the Conference during which the members of the Board of Governors were elected and the Director General appointed, the majority of the members departed on an inspection tour of atomic energy centers in other western European countries in order to become informed of as many international atomic energy developments as possible. Two members of the committee, however, remained in Vienna, including Congressman Cole who remained throughout the 3 weeks' duration of the Conference.

At the conclusion of the first week, the members held a meeting with Mr. McKinney who outlined for them the policy questions anticipated to be discussed in the remaining 2 weeks of the Conference, and discussions were held concerning the proposed United States positions on these questions.

Congressman W. Sterling Cole, an esteemed member and former chairman of the committee, was appointed and approved unanimously as the first Director General of the International Atomic Energy Agency.

The members of the Joint Committee have followed with great interest from the beginning the negotiations leading to the creation of the International Agency, and believe that it has tremendous potential for the future benefit of mankind, but also many problems and difficulties still to be solved before reaching its full usefulness. We feel that our former colleague, W. Sterling Cole, is a man ideally suited to help overcome these difficulties, and we wish him good luck and Godspeed in his future endeavors.

Attached as appendix A is a more detailed Report of the Joint Committee on Atomic Energy on the General Conference of the International Atomic Energy Agency.

II. APPRAISAL OF WESTERN EUROPEAN ATOMIC ENERGY DEVELOPMENTS

Prior to and following participation in the Vienna meeting, the members inspected facilities and held discussions with scientists and leaders of other western European countries concerning their atomic energy programs and developments. Visits were made as summarized briefly below:

A. Germany

Three committee members visited West Berlin, Germany, on September 24 and 25, 1957. While there, they received a briefing at the headquarters of the United States mission on the special military and economic problems of that isolated outpost of freedom, and also a briefing and report on the peaceful atomic energy program of West Germany as a whole. In addition, the committee members visited the proposed site in Berlin-Wannsee of the Berlin Nuclear Research Institute which will include a reactor made possible by an agreement of cooperation between the Government of the United States and the Government of West Berlin. This agreement had required, in the preceding session of Congress, legislative action (Public Law 14, 85th Cong., 1st sess.) in the form of an amendment to the Atomic Energy Act of 1954, which the Joint Committee had considered and had recommended to the Congress.

Following their visit to this reactor site, the members proceeded to the Berlin City Hall where they held a meeting with the acting burgermeister and city council members.

While in West Berlin, the members of the Joint Committee also visited briefly the recently dedicated Congress Hall constructed with United States assistance for the benefit of the West Berlin people as a symbol of liberty and friendship. The committee members were impressed by the spirit of good will and hope for the future expressed by the construction and existence of this building. Before leaving Berlin the committee members also underwent the sober experience of crossing into East Berlin where they noted the gloomy and unreconstructed devastation remaining from World War II, in marked contrast to the bustling and prosperous free enterprise so visible in the western sector of Berlin.

B. England

Members of the Joint Committee on Atomic Energy visited England from September 25 through September 29, 1957. During this period visits were made to the laboratory and test center at Dounreay, Scotland; the nuclear research center at Harwell, England; and the plutonium and power reactor center at Calder Hall on the northwestern coast of England, opposite the Isle of Man. In addition, the members received an excellent briefing at the United States Embassy in London on September 26 on military and atomic energy matters, and enjoyed a fruitful meeting with Sir Edwin Plowden and his staff that same day in the offices of the United Kingdom Atomic Energy Authorities.

During the visit to Dounreay on September 25, a complete tour of the area was provided, including a visit to the fast breeder reactor facility which is scheduled to commence operation in the spring or summer of 1958.

The trip to Harwell took place on September 27, and included a visit to the Bepo and Lido research reactors, and a briefing and visit to the metallurgy laboratory. Following the visit, the members returned to London and caught the night train for Calder Hall.

On Saturday, September 28, committee members inspected the Calder Hall reactors. After receiving a brief description of the overall plant, they were escorted to the two large reactors of the B station which were under construction (to be completed in 1958 and 1959) and were permitted to go inside the reactor chamber itself. Workers were proceeding with the project even on this Saturday, and the British reported that the construction was on schedule and that operation of the first reactor of B station was expected to begin in the fall of 1958.

The committee members were then escorted to the reactor plant of A station which had been in operation since October 17, 1956, and of which our British friends are so justifiably proud. Following their visit, the committee members proceeded to a nearby airport and returned by plane to London in the early evening.

On the following day, Sunday, the committee members proceeded by airplane to Vienna, Austria, where they participated in the First General Conference of the IAEA as recounted in part I of this report.

C. Denmark

Members of the committee visited Denmark on the way to Moscow in order to meet with Danish atomic energy officials and to inspect atomic energy developments in that country on October 6 and 7, 1957.

On the evening of Sunday, October 6, the members were invited to an informal buffet at the residence of the United States Ambassador and Mrs. Peterson, where they met with the world-famous scientist and pioneer, Dr. Neils Bohr, and other Danish atomic energy officials. On the following day the committee members were escorted on a tour of the Danish Atomic Energy Institute at Risoe, 30 miles west of Copenhagen. At this site, the Danes have successfully installed and operated a research reactor, a test reactor, a gamma radiation facility, and extensive interconnected laboratories for nuclear research activities.

Following the visit to inspect facilities in Denmark, the committee members divided into two groups, one of which proceeded to Moscow for discussion and inspection of the facilities made available there, while the other groups proceeded to Greece and Italy in order to learn of and inspect developments in those countries.

D. Russia

The group which visited Russia did so in order to inspect facilities and developments in that country pertaining to the peaceful uses of atomic energy. The group arrived on Tuesday evening, October 8, and departed on Sunday afternoon, October 13, 1957.

On October 9, 1957, the members of the group visited briefly the United States Embassy in Moscow, and then proceeded to Obninskoye, about 80 kilometers southwest of Moscow, for an inspection of the 5,000-kilowatt atomic reactor which has been in operation since the summer of 1955.

Although the building housing the reactor, and the nonnuclear construction were not impressive, there is no doubt but that the reactor itself had been, and was being, successfully operated and that the technical personnel had been well trained and were highly competent to carry out their assignments. Many of the safety devices and control arrangements appeared similar to those used in our own facilities. The tour of the plant lasted some 3 or 4 hours, and the group then returned to Moscow, after dark.

The members of the committee from the outset requested permission to visit and inspect the large-scale atomic powerplants allegedly under construction and referred to as "Project No. 1" and "Project No. 2," and described by the Russians in various papers and in international meetings such as that at Belgrade in the spring of 1957. The Soviet officials did not oblige the committee in this request but instead offered a variety of trips and facilities which the committee members might inspect and which were interesting but which did not permit an evaluation of the current U. S. S. R. reactor construction program. One member of the committee was informed that construction had not yet begun on one of these projects, and that site construction had just been initiated at the second project.

Our Russian hosts were, however, genial and polite, and answered all questions concerning the places and facilities which the members were permitted to visit and inspect.

On the second day, Thursday, October 10, the committee members visited the Agriculture and Industrial Fair in Moscow which includes a permanent building entitled the "Atomic Building." This building contains many of the exhibits displayed by the Russians at the International Conference in Geneva in the summer of 1955 and also other

displays and exhibits especially constructed for this building, including a small operating research reactor of the swimming-pool type. The exhibits were artfully displayed and described, and literally thousands of persons from all areas behind the Iron Curtain reportedly were escorted through the building each day. The members were impressed with the effort and the ability of the Soviets to capture the minds and the dreams of these peoples by means of these displays of the potential benefits of the atom. It appeared that the Soviet Government intends to make well known its achievements in the field of the peaceful uses of the atom, while at the same time maintaining secrecy as to its nuclear weapons program.

On the afternoon of Thursday, October 10, the committee members were escorted to the University of Moscow at the southern border of the city where they held a meeting with the head of the department of physics and several of his professional assistants. They were then conducted on a tour of the physics building and shown several laboratories used to teach students and to perform experiments in the field of nuclear physics. The members noted the large number of Chinese students attending the university, as well as students from other countries behind the Iron Curtain.

On the third day, Friday, October 11, the members were offered tours to two more institutions dealing with atomic energy, although no action was still forthcoming as to the requests to visit "projects 1 and 2."

In the morning, the group visited the Moscow Hospital where they were shown facilities using radioisotopes, and observed patients suffering from cancer being treated with radioisotopes. In the short time available for this inspection, it appeared to the members that the Russian progress in this field was much less advanced and much less extensive than in the United States.

On the afternoon of Friday, October 11, the group proceeded on a short tour of the Kremlin until word was received that permission had been granted for a visit to the Thermal Technical Institute on the edge of Moscow. Proceeding to the Institute, the members were cordially received by the Director of the Institute who had visited the United States, and were conducted on a tour of the facilities which included a research reactor which had been in operation for more than 2 years.

On the fourth day, Saturday, October 12, the members had still not been granted permission to inspect "projects 1 and 2," the atomic power stations announced by the Russians to be under construction, but were escorted to the Nuclear Research Institute at Dubna, approximately 100 kilometers north of Moscow, which all of the members had also desired to visit.

At Dubna, the members of the group were conducted on a tour of the famous Russian cyclotron, at present the largest in the world, with a capacity of 10 billion electron volts.

The tour was conducted by Dr. Wexler, who has achieved world famous stature because of his design and supervision of the construction of this cyclotron. The members also visited and inspected a smaller cyclotron of 680 million electron volts which had been constructed at an earlier date and was still in operation. The Russians are building three additional laboratories at Dubna (for high energy physics, for theoretical physics, and for microphysics) at considerable

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expenditure and with a noticeable sense of urgency. During the preliminary lecture and tour of the Institute, the Institute Director repeatedly emphasized the international character of the Institute which is composed of Russian scientists, and scientists from 10 other countries behind the Iron Curtain, including China, Czechoslovakia and Poland. In the future the Institute may be expanded to include training of scientists from non-Soviet bloc countries, according to the Director of the Institute.

The trip to Dubna required approximately 2 hours in each direction from Moscow, and the committee members spent approximately 4 to 5 hours in Dubna, returning to the city of Moscow in the early evening.

On that Saturday evening, the last night of their stay in Moscow, several of the members took a journey in the Russian underground subway system and were impressed by the magnificence of this construction which could conceivably have great value for civil-defense purposes.

On the fifth and last day in Moscow, Sunday, October 13, the members attended church, and then proceeded in the afternoon on a tour of the Lenin-Stalin Mausoleum, and then to the United States Embassy where mutual discussions were held with Embassy officials. At the airport a guided tour was provided of the TU–104, the new Russian jet commercial airliner.

The members of the group who visited Russia were impressed with the desire and the ability of the Russians to achieve scientific goals which, under their system of controlled work and priorities, may be ordered by the State for military and propaganda purposes. The Russians have been expending great financial and personal efforts since World War II in building up an elite corps of highly trained and highly competent scientists who can be used by the State for whatever purposes the State determines best.

Besides being able to direct the programs into which scientific efforts should be channeled, the Russians appeared to the group to have the further advantage of maintaining secrecy until developments had been achieved when an announcement could be made designed for maximum propaganda effect. The group visited Russia during the period between the launching of Sputnik I and Sputnik II. In addition to an understandable and justifiable national pride over the success of Sputnik I, the members observed a feeling of great confidence as to the future ability of Russian scientists to achieve ever more difficult goals.

E. Greece

Several members of the committee visited Greece on October 9 and 10, 1957. Cooperation between the Greek Government and our own will soon bear fruit in the form of a 1-megawatt swimming-pool research reactor to be constructed by a United States firm and installed in the suburbs of Athens. The United States has also presented an atomic energy library to Greece, and the officials of that country exhibited appreciation and hope for further cooperation in the future.

During the committee members' visit to Athens, in addition to a briefing by Ambassador George Allen and his staff, the group visited the Alexandra Hospital where they were shown the interesting work with radioisotopes for medical uses being carried on by dedicated personnel with adequate but somewhat limited facilities. The group

also visited the site which was being excavated for the research reactor, and attended a reception by the Ambassador and met members of the Greek scientific and governmental community interested in atomic energy.

F. Italy

The members of the committee who visited Greece also visited Italy on October 11 and 12. The Italians are proceeding on a broad research reactor program involving installation of 4 or 5 reactors at university centers in Milan, Rome, and elsewhere. In addition, the Italians are negotiating with the British for a Calder Hall type power reactor in northern Italy, and with 2 United States firms for 2 other power reactor projects.

The members were given a briefing by the staff of the Embassy, and conferred with representatives of the SENN atomic power group which is currently obtaining proposals for construction of an atomic powerplant in southern Italy with some financial backing by the World Bank. The group also conferred with the Director of the Italian Atomic Energy Committee which generally coordinates the Italian atomic research and development program.

The Italian officials exhibited enthusiasm for future atomic power projects in their country where the need is great, and a desire to keep informed and cognizant of technical developments in both the United Kingdom and the United States.

G. Sweden

Four members of the committee visited Sweden on October 14 after returning from Russia. After a briefing at the United States Embassy, the members proceeded to an inspection of the underground research reactor located in Stockholm, an outstanding Swedish accomplishment. This reactor has been in operation since July 1954 with a thermal power of 300 kilowatts, and the Swedish scientists exhibited competence and enthusiasm. The Swedes have successfully constructed their initial research reactor R1 themselves, and are interested in purchasing a testing reactor R2 from a United States firm.

The committee members were much impressed with the underground installation of R1, with obvious civil defense and safety advantages.

At a meeting in the afternoon the members discussed mutual problems with the leaders of the Swedish program and heard a comprehensive survey entitled "The Growth of Atomic Energy in Sweden" as delivered by Dr. Harry Brynielsson, managing director of the Swedish Atomic Energy Company, a combination Government-industry institution.

H. Belgium

On Wednesday, October 16, 1957, the members of the Joint Committee inspected the Belgian Nuclear Institute at Mol about 50 miles from Brussels. They were received by Mr. Louis de Heem, managing director of the Nuclear Institute and Mr. Julian Goens, director of the laboratory and were given a complete tour of the laboratory, a monument of the nuclear accomplishments of that small country. The laboratory includes a research reactor in operation since the summer of 1956, and three more research and test reactors planned for construction in the near future.

I. France

Several members of the committee visited France from October 18 to 21 in order to learn of the important atomic energy developments in that country

The visit to France included the following: A briefing at the United States Embassy on the French atomic energy program, OEEC and Euratom; a trip to SHAPE headquarters and a briefing by General Norstad on Saturday, October 19, 1957; a visit with the director of the French atomic energy program and a trip to Saclay, near Paris, and an inspection of the Nuclear Institute there.

The French program is generally underestimated in the United States. The committee members were impressed by the magnitude of the French effort and with the sense of national pride in atomic energy development. The French are now producing plutonium and planning an expanding atomic power program. Future cooperation with French scientists and French leaders should be encouraged.

The committee members received valuable assistance during the trip from the following liaison officers: Thomas D. Huff, State Department; Bryan LaPlante, Atomic Energy Commission; Col. Jerry Jorgenson, United States Air Force; and Maj. Walter Weddle, United States Air Force.

III. SUMMARY AND CONCLUSIONS

1. Members of the Joint Committee on Atomic Energy, during the period from September 24, 1957, to October 21, 1957, spent 1 week in Vienna, Austria, attending the opening of the International Atomic Energy Agency, and also visited 9 other countries in Western Europe and inspected 14 atomic energy facilities. In addition, in each country they received a briefing as to developments and plans for the peaceful uses of atomic energy, and met many of the scientific and governmental leaders in those countries.

2. The successful creation of the International Atomic Energy Agency constitutes an important step forward in encouraging the uses of the atom for peaceful rather than military purposes. We were favorably impressed with the spirit and the initial accomplishments of the Vienna meeting.

3. The International Agency has many problems remaining to be resolved, including the organizational relationship between the Director General and the Board of Governors, and the relationship of the Agency to regional organizations such as Euratom and the OEEC.

The joint committee plans to watch with great interest the future development of the Agency, with its worthy objective of promoting world peace and cooperation through nations in developing the peaceful uses of atomic energy.

4. The scientists and engineers in Western Europe have demonstrated ingenuity and resourcefulness in their atomic energy programs, and are capable of making many more contributions to the advancement of nuclear science. The United States should receive technical benefits for our own program by close cooperation between our own scientists and those of Western Europe.

5. The British have constructed and are operating large-scale plutonium and power reactors at Calder Hall, of which they can be justifiably proud. The British are planning construction of 15 to

20 more reactors of the Calder Hall type to produce electricity. The British reactor development program is not as broad as that of the United States, but advancements are being and will continue to be made through volume production of similar or identical components in their reactors.

6. The Russians have not yet permitted inspection of their atomic powerplants which they claim are under construction. But the Soviet accomplishments to date in the field of basic and nuclear science are impressive, and, if given a high enough priority, there would seem to be little reason for doubting their ability to construct successful atomic powerplants.

7. Atomic energy and electricity from the atom continue to be subjects of great interest to the peoples of Western Europe. Through cooperation in this field, the United States stands to gain both material benefits and ties of friendship which dollars alone cannot purchase.

8. In planning its own program for the development of atomic power, the United States must necessarily consider the programs and the needs for electric power of other countries, especially those of Western Europe.

APPENDIX A

Report of the Joint Committee on Atomic Energy on the First General Conference of the International Atomic Energy Agency

Nine members of the Joint Committee on Atomic Energy attended the First General Conference of the International Atomic Energy Agency, held in Vienna, Austria, starting on October 1, 1957, and ending on October 23, 1957. The members were Hon. Carl T. Durham, chairman; Representatives Chet Holifield, Melvin Price, John J. Dempsey, Sterling Cole, and James E. Van Zandt; and Senators John O. Pastore, Albert Gore, and Bourke B. Hickenlooper.

FIRST ANNUAL GENERAL CONFERENCE

For technical legal reasons the Conference was broken into two parts. First there was an annual meeting of the General Conference of the International Atomic Energy Agency.

OFFICERS AND COMMITTEES

The General Conference elected as its President, Dr. Karl Gruber, the head of the delegation of the host country of Austria. They elected the following eight countries as Vice Presidents: France, India, Indonesia, Japan, Union of South Africa, Union of Soviet Socialist Republics, United States, and Venezuela. The members of the General Conference then sat as members of the permanent committees. They elected Ambassador Muniz of Brazil as Chairman of the Committee on Organization and Budget, and Ambassador Spanides of Greece as Vice Chairman, and Ambassador Kos of Yugoslavia as Rapporteur. They next elected Ambassador Fahmy of Egypt as Chairman of the Administrative and Legal Committee and Ambassador Erice of Spain and Ambassador Gamard of Denmark as Rapporteur. The General Conference then filled the four vacancies on the General Committee (which acted as the Steering Committee) with the election of Australia, Canada, Poland, and the United Kingdom to sit with the President and the 8 Vice Presidents and the Chairmen of the 2 permanent committees.

The main purpose of the General Conference was to elect 10 members to the Board of Governors, but it also received the report of the Preparatory Commission. The 10 members elected were: Argentina, Italy, Rumania, Egypt, Pakistan, Indonesia, Korea, Guatemala, Peru, and Turkey. Argentina, Pakistan, Rumania, Turkey, and Korea were elected for 2-year terms and the other members were elected for 1-year terms.

SPECIAL SESSION OF GENERAL CONFERENCE

Immediately upon this election, the First Annual General Conference adjourned and a special General Conference met. This was because the Directors named by the First General Conference were not eligible to sit until the end of that General Conference. The special session of the General Conference continued with the same officers and committees. The special session of that General Conference then sat concurrently with the Board of Governors. This allowed the Board of Governors to perform its necessary responsibilities under the statute and then to transmit its actions to the General Conference for any necessary approvals.

BOARD OF GOVERNORS

In addition to members elected as stated above, the Board of Governors had the following members which had been selected by the Preparatory Commission: Australia, Brazil, Canada, Czechoslovakia, France, India, Japan, Portugal, Sweden, Union of South Africa, Union of Soviet Socialist Republics, United Kingdom, and the United States of America. At its first meeting the Board of Governors, by unanimous vote, elected Ambassador Winkler of Czechoslovakia

as Chairman, Ambassador Wershof of Canada, and Ambassador Furuuchi of Japan as its two Vice Chairmen.

DIRECTOR GENERAL

At its first meeting October 4 the Board of Governors also appointed Hon. Sterling Cole as Director General for a term of 4 years. This appointment was confirmed by the General Conference on October 7. Mr. Cole took his oath of office before the General Conference that afternoon. The Communist-bloc countries abstained from voting in support of Mr. Cole's nomination both in the Board of Governors and in the General Conference, stating that they preferred to see a neutral in that position. In light of the fact that Mr. Cole would not be able to assume his duties until December 1, it became necessary for the Board to make some temporary arrangement so that certain essential operations of the Agency could be carried on in the absence of Mr. Cole. The Board authorized Dr. Paul Jolles, Secretary General of the General Conference to carry out the necessary functions of the Director General until Mr. Cole's return.

MEMBERSHIP

At the Conference which drafted the statute and which was held at the United Nations in New York in the fall of 1956, 81 nations approved the statute. By the end of the period set in the statute for signing, 80 of the 81 nations signed. By the opening day of the General Conference of the Agency, 52 of these nations ratified and deposited their certificate of ratification. By the end of the General Conference, six more nations had ratified and deposited their certificate of ratification.

Finland, which was not a signatory of the statute, applied for membership in the Agency and was approved by both the Board of Governors and the General Conference. This was the first nonsignatory nation to become a member.

RED CHINA

Following up the moves which had earlier been made to get Communist China to be admitted to the Conference, the Communist bloc made several attempts to bring in Red China. In the Credentials Committee and in the General Conference, the credentials of the Nationalist Republic of China were accepted despite opposition. In the General Conference it was further decided by a majority of 29 to 17, with 4 abstentions, not to discuss the subject of China's representation for the duration of 1957. In addition, moves to permit all nations of the world, including Red China, to send observers to the General Conference were disapproved by the General Conference.

BUDGET

The Board of Governors and the General Conference approved the general suggestions made by the Preparatory Commission for the program of activities and the budget of the Agency for the first year. The budget will amount to about $6 million for the first year, including the repayment of the loan from the United Nations for the operations of the Preparatory Commission. In accordance with the provisions of the statute, the general scale of contributions of the members will be patterned on the scale of the United Nations. Up until this year the share of the United States had been 33⅓ percent. This is the percentage of the first year's budget that the United States will bear in the Agency. After this scale was agreed to, the United States received a lesser share of the United Nations scale of assessments, and this lesser share will be reflected in future years assessments in the Agency, including any retroactive adjustments which may be made.

Because most of the members have to go through appropriations procedures similar to ours before the first assessments can be paid, it is not expected that there will be any money flowing into the Agency until late next spring, or thereafter. Therefore, it was necessary for the Agency to find some way to get operating funds for the interim period. Austria offered to make an interest-free loan to the Agency. In addition, the United Nations agreed to postpone the repayment of that part of the loan to the Preparatory Commission which was repayable this spring.

GENERAL DEBATE

General debate statements were made by 40 delegations. Political debate was kept to a minimum and the general atmosphere created was a cooperative one. About 15 delegations made offers of training facilities to foreign students, and 7 made offers of materials, the latter group included the following: Portugal, the U. S. S. R., the United Kingdom, the United States, Brazil, Canada, and Yugoslavia. The latter three did not mention specific quantities, but said they would have materials to make available to the Agency. Portugal offered 100,000 kilograms of natural uranium, the United Kingdom 20 kilograms of U–235, the U. S. S. R. 50 kilograms of U–235 in concentrates up to 20 percent, the United States has continued its offer to match all these contributions in addition to our previously announced offer of 5,000 kilograms of U–235. The Russian offer was rephrased in terms of various concentrates of U–235, such as if the Agency sought to have only 1 percent concentrate then Russia's contribution would be a total of 5,000 kilograms of uranium, or the numerical equivalent of the United States offer of top grade U–235. Several other delegations expressed interest in utilizing facilities made available through the Agency for training purposes and to obtain materials. Consequently, the members of the Agency are taking a serious attitude toward the Agency and the programs it might be able to develop.

PROGRAM

The Preparatory Commission submitted a report to the Agency which included not only a proposed budget for the first year, but also a general program for the Agency to follow. This report, insofar as it contained the program of the Agency was adopted in quick order by both the Board of Governors and by the General Conference.

The report, however, is in general terms and while it recommends avenues of approach it does not give any specifics as to the extent to which the Agency should get into any of the various programs. These specifics will have to be worked out by the Director General with the aid of his staff and presented to the Board of Governors and the General Conference in years to come. There has been some feeling that this report does not move the Agency along fast enough in the field of power reactors. However, there are so many things to be done before such a program can be undertaken on a large scale that the report indicated it would be premature to try to give any specifics for a power reactor program at this time.

PRIVATE MEETINGS OF THE BOARD OF GOVERNORS

After considerable discussion the Board decided to hold its meetings in private unless it decides otherwise. The Soviet Union, Czechoslovakia, India, and a few other delegations maintained that all meetings should be open. This problem is not solved, however, as many members of the Agency who were not on the Board feel that they are entitled to be better informed of the work of the Board. In order to resolve this problem the Board of Governors approved letting any member nation that desired sit as an observer in the Board meetings. Nations which are not members of the Agency are not authorized to sit as observers in either the Board of Governors or the General Conference.

HEADQUARTERS FACILITIES

While the General Conference formally approved Vienna as the site for the headquarters of the Agency, no final action was taken on the exact facilities which would be used for the headquarters. Austria had offered to let the headquarters use as a temporary measure an old Army hospital, built about 1905. While some members of the Board of Governors seemed to want to take advantage of this offer, there was strong opposition on the part of others—basically based on the age and the remote location of the hospital. This will probably be one of the items on which the Board of Governors will await further action until the Director General has had a chance to make further study and report.

RELATIONSHIP WITH OTHER ORGANIZATIONS

The Board and the General Conference have approved the relationship agreement between the United Nations and the IAEA worked out between the Preparatory Commission and the Secretary General's Advisory Committee on Atomic Energy. The General Conference has requested the Board of Governors to begin negotiations with specialized agencies to work out relationship agreements which would take into account the guiding principles prepared by the Preparatory Commission. The Norwegian delegation has suggested that the Agency join the expanded technical assistance program of the United Nations and this question will be studied further by the Board of Governors.

OTHER MATTERS

Other items which the General Conference approved were: (1) Staff regulations; (2) financial regulations; and (3) the headquarters agreement. The Board of Governors still have the headquarters facilities agreement to work out, as well as the Table of Organization of the Secretariat of the Agency.

APPENDIX B

Statements on Atomic Energy Activities in Europe, September 1957

Prepared by the Division of International Affairs, Atomic Energy Commission, for use by members of the Joint Committee on Atomic Energy

A. Austria

I. ATOMIC ENERGY ORGANIZATIONS

A. *Atomic Energy Advisory Commission.*—The overall governmental advisory body. Mr. Franz Matsch is the Chairman.

B. *Austrian Study Company for Atomic Energy (Oesterreichische Studiengesellschaft fur Atomenergie), Vienna, Austria.*—A study company in which the Government holds 51 percent of the shares, the remainder being held by various enterprises and industrial associations. Responsible for the planning and implementation of a nuclear energy program in Austria. Officers: Dr. Rudolph Stahl, Director General; Mr. R. Furst and Dr. K. Laschtowiezka, Deputies; Dr. Michael Higatsberger, Scientific Director.

II. ATOMIC ENERGY INSTALLATIONS AND ACTIVITIES

A. *Institute of Technology (Technische Hochschule) at Vienna.*—Includes extensive laboratory facilities in chemical and physics research, particularly metallurgical aspects. Also will have an exponential pile (natural uranium and water), which is presently in the planning stage.

B. *Döllersheim site.*—A projected 5-megawatt swimming-pool tank-type reactor will probably be located at this town, 70 miles west of Vienna. Several American firms will receive invitations to make bids for construction of this reactor.

III. UNITED STATES—AUSTRIAN COOPERATION

1. An unclassified research agreement became effective on June 8, 1956.
2. An atomic energy technical library was presented to Austria on September 14, 1955.

B. Denmark

I. ATOMIC ENERGY ORGANIZATION, ESTABLISHED MARCH 1955

1. Name: Danish Atomic Energy Commission.
2. Address: Sdr. Ridebanefloj, Christiansborg, Copenhagen, Denmark.
3. Description: 24-man group, composed of ranking officials from industry and science areas. Members are appointed for 3-year terms, and are responsible to the Minister of Finance. A seven-man Executive Committee handles the day-to-day operation of the Commission's activities.
4. Officers: Niels Bohr, Chairman. Executive Committee: Hans Henrik Koch, Chairman of the Executive Committee, and Chief of Department of Ministry for Social Affairs; H. P. Christensen, director, Helsingor Shipyards; Robert Henriksen, director of NESA (Electric Works); Eiler Jensen, chairman, Cooperative Labor Union; Ebbe Rasmussen, professor, theoretical physics; Paul Brandt Remberg, professor, animal physiology; H. Stevenius-Neilson, director, Danish sulfuric acid and superphosphate factory; C. C. Thomsen, Secretary of the Executive Committee.

II. ATOMIC ENERGY INSTALLATIONS AND ACTIVITIES

1. Installations

A. *Risoe Research Center, located 30 miles west of Copenhagen.*—Main facility of the Danish AEC.

Principal officers: Dr. J. C. Jacobsen (scientific); Mr. T. Bjerge (administrative).

Facilities: 500-watt water-boiler reactor, 5-megawatt test reactor, gamma radiation facility, and extensive interconnected labs for physics, health physics, electronics, and agriculture.

B. *Society for Industrial Utilization of Nuclear Energy, located in Copenhagen.*—Group of some 40 Danish firms interested in nuclear energy.

Activities: Cooperation with Danish AEC in developing industrial aspects of nuclear energy.

2. Interests and activities

A. *Reactor program.*—

(1) Name: DR–1 located at Risoe (the "homogeneous thermal light-water moderated reactor").

Type: 500-watt enriched uranium fueled, light-water moderated and cooled solution-type reactor.

Date critical: Summer, 1957.

Comments: Atomics International Division of North American Aviation (United States) designed and constructed the reactor components. Will be used for research and training.

(2) Name: DR–2 located at Risoe (the "heterogeneous thermal light-water moderated reactor").

Type: 5 megawatts, enriched uranium fueled, light-water moderated, tank-type materials testing reactor.

Date critical: About January 1, 1958.

Comments: Foster Wheeler Corp. is designing and constructing the reactor components.

Purpose: Research and training in reactor physics, materials testing, solid state physics, metallurgy, reactor technology, and production of radioisotopes.

(3) Name: DR–3, to be located at Risoe, heavy-water test reactor (pluto type).

Type: 10 megawatts, enriched uranium heavy-water moderated test reactor.

Date critical: To be installed by 1959.

Comments: Contractor is Head Wrightson Processes, Ltd., (United Kingdom).

B. *Other activities.*—Denmark is ultimately interested in the development of a comprehensive power program; particularly since she has to import all of her fossil fuels.

III. UNITED STATES-DANISH COOPERATION

1. Agreements for cooperation

A standard unclassified research agreement became effective July 25, 1955. An amendment, increasing the fuel available under the bilateral from 6 to 12 kilograms of U–235, became effective February 14, 1957.

2. Sale or lease of atomic energy equipment or materials

A. *Reactors.*—Sale of reactor components to Denmark by Atomics International and by Foster Wheeler Corp.

B. *Other materials.*—Lease contracts for fuel for the DR–1 and DR–2 reactors (described above), sale contracts for small quantities of uranium for two fission chambers and a sale contract providing for the transfer of a research quantity of highly enriched uranium, have been signed with Denmark.

3. Library

An atomic energy technical library was presented to Denmark in the summer of 1955.

C. Euratom

I. STATUS OR RATIFICATION

On March 25, 1957, the Governments of France, the Federal Republic of Germany, Italy, the Netherlands, Belgium, and Luxembourg signed at Rome the treaty establishing the European Community for Atomic Energy (Euratom).

Schedule of ratification is as follows:

1. France National Assembly approved July 9; Council of the Republic approved July 24.

2. Germany Bundestag approved July 5; Bundesrat approved July 30.

3. Italy Chamber of Deputies approved July 30; Senate reconvenes September 24. Debate of treaty is the first item on the agenda. Final approval expected in mid-October.

4. Netherlands treaty submitted by the Government to Parliament on July 9. Parliament to reconvene in mid-September with final lower house action expected in early November.

5. Belgium Parliament to convene on or about November 12 with final action not expected before late November at the earliest.
6. Luxembourg Parliament normally convenes on second Tuesday in November, but a special session to deal with the Euratom and Common Market treaties is scheduled in October.

It is expected that all instruments of ratification will be deposited by late November or early December and that the treaty will enter into effect on January 1, 1958.

II. STRUCTURE OF COMMUNITY

The treaty established an Atomic Energy Community whose organs are an Assembly, a Council, a Commission, and a Court of Justice as well as an advisory Economic and Social Committee. The community's stated purpose is "to contribute toward raising the standard of living in member states and toward promoting commercial exchanges with other countries by establishing the conditions necessary for the rapid development and growth of nuclear industries."

In the accomplishment of this purpose the community is to—

"(*a*) Develop research and ensure the dissemination of technical knowledge;

"(*b*) Establish, standardize, and supervise the application of safety precautions to protect the health of workers and of the general public;

"(*c*) Facilitate investment and, in particular by encouraging firms to launch new projects, ensure the construction of the basic installations required for the development of nuclear energy in the community;

"(*d*) Ensure a regular and equitable supply of ores and nuclear fuels to all consumers in the community;

"(*e*) Guarantee, by suitable measures of control, that nuclear materials are not diverted to purposes other than those for which they are intended;

"(*f*) Exercise recognized ownership rights over special fissile material;

"(*g*) Assure extensive markets and access to the best technical means by establishing a Common Market in specialized materials and equipment, by the free movement of capital for nuclear investment and by freedom of employment for specialists within the community;

"(*h*) Establish with other countries and with international organizations all contacts that are calculated to further the peaceful uses of atomic energy."

III. "WISE MEN" REPORT

In anticipation of the coming into being of the community, the heads of the delegations at the Intergovernmental Conference on the Common Market and Euratom, acting on instructions from their respective foreign ministers instructed Louis Armand of France, Franz Etzel of Germany, and Francesco Giordani of Italy on November 16, 1956, to report to them on the amount of nuclear energy which could be produced in the six nations in the near future and the means to be employed for this purpose.

In May 1957 the report of Messrs. Armand, Etzel, and Giordani, entitled "A Target for Euratom" was published. The report recommended that the community install 15,000 megawatts of nuclear electrical generating capacity by 1967. The report also contemplated the buying or building under license of pressurized and boiling-water reactors from the United States and gas-cooled reactors from the United Kingdom would constitute a substantial part of the total nuclear powered generating capacity to be constructed over the 10-year development period.

IV. UNITED STATES POSITION REGARDING EURATOM

As a matter of official policy the United States Government has expressed its welcome for the initiative taken in the "bold and imaginative" proposal of the Euratom report. The President recognized these efforts in stating "significant actions are underway to create an international agency and an integrated community for Western Europe to develop peaceful uses of atomic energy. The United States welcomes this progress and will cooperate with such agencies when they come into existence." The United States further has declared that it anticipated active association in the achievement of Euratom's objectives, and foresees a fruitful two-way exchange of experience and technical development, opening a new area for mutually beneficial action on both the governmental and the industrial level and reinforcing solidarity within Europe and across the Atlantic.

D. France

I. ATOMIC ENERGY ORGANIZATION, ESTABLISHED 1945

1. Name: French Atomic Energy Commission—Commissariat á l'Energie Atomique (CEA).
2. Address: Boite Postale 307, Paris, France.
3. Description: A Government agency with appreciable administrative and financial autonomy. The Commissariat is administered by the Atomic Committee, a Cabinet advisory group composed of 10 members which meets once per month.
4. Officers: Dr. Francis Perrin, High Commissioner of the Atomic Committee; Pierre Guillaumat, Administrator General; Jules Gueron, Director of Programs; Bertrand Goldschmidt, Director of Foreign Relations; Pierre Taranger, Director of Industrial Development.

II. ATOMIC ENERGY INSTALLATIONS AND ACTIVITIES

1. Name: CENS (Centre d'Etudes Nucleaires de Saclay).
Location: Saclay; about 20 miles southwest of Paris.
Type: Largest nuclear research laboratory of the Commissariat. Staff of about 2,500 persons.
Principal officer: Director, Jean Debiesse.
Principal facilities: Heavy-water research reactor (EL–2), heavy-water test reactor (EL–3), reactor for lattice studies (Aquilon), homogeneous plutonium reactor (Proserpine), 2 Bev. proton synchrotron (Saturn), 25 Mev. cyclotron, 5 Mev. Van de Graff, physics, chemistry, metallurgy, and biology laboratories.
2. Name: Fontenay-aux-Roses (previously called Chatillon).
Location: Southern outskirts of Paris.
Type: Nuclear research center of the Commissariat.
Principal officers: Director, M. Baissas.
Principal facilities: Zoe research reactor, pilot plant for chemical reprocessing, radioisotope preparation.
3. Name: CENG (Centre d'Etudes Nucleaires a Grenoble).
Location: Grenoble.
Type: Research center of the Commissariat in conjunction with the University of Grenoble.
Principal officers: Director, M. Neal.
Principal facilities: Swimming-pool reactor (completion 1958).
4. Name: Marcoule.
Location: 25 miles northwest of Avignon, in southern France.
Type: Largest industrial center of the Commissariat.
Principal officers: Manager, Maurice de Rouville.
Principal facilities: Plutonium-producing reactors G–1 (G–2, and G–3 under construction), chemical reprocessing plant, graphite fabrication plant.
5. Name: Le Bouchet.
Location: About 30 miles south of Paris.
Type: The uranium and thorium processing plant of the Commissariat.
Principal officers: Manager, P. Vertes.
Principal facilities: Uranium processing plant (300 tons uranium per year), thorium processing plant (approximately 300 tons thorium oxide per year).
6. Name: ATEN (Association Technique pour la Production et l'Utilization de l'Energie Nucleaire).
Location: Paris.
Type: Organization of industrial groups in France interested in the nuclear energy field.
Principal officers: President, Robert Gibrat (director general of INDATOM).
Interests and activities: Serves the same role in France as the Atomic Industrial Forum in the United States.
7. Name: INDATOM (Groupement pour l'Industrie Atomique).
Location: Paris.
Type: A group of some 10 important firms, each of which is specialized in a different field of importance in the development of nuclear energy.
Principal officers: Director general, Robert Gibrat.
Interests and activities: Has established its own atomic engineering and research team and uses the laboratories of its members. Is designing: thorium-U233 chemical separation pilot plant, 1 megawatt swimming-pool reactor for Grenoble, nuclear-powered tanker ship (gas-cooled reactor).

8. Name: France-Atome.
Location: Paris.
Type: A group of industrial firms (an extension of those which worked on the G–1 reactor).
Principal officers: President, R. Baumgartner.
Interests and activities: Design and construction of the G–2 and G–3 reactors. Design study of a nuclear-powered tanker ship.
9. Name: Auxi-Atome.
Location: —.
Type: Group of smaller companies interested in the atomic energy field but which are not members of INDATOM or France-Atome.
Principal officers: —.
Interests and activities: —.
10. Name: Propatome.
Location: —.
Type: Firm formed by the three largest shipyards in France and the huge Schneider-Creusot heavy machinery company.
Principal officers: —.
Interests and activities: To coordinate efforts in the field of nuclear propulsion. Plans to work closely with France-Atome.
11. Name: CARA (Compagnie d'Applications et de Recherche Atomiques).
Location: Paris.
Type: Company formed by a number of French firms, including Societe Air Equipment, Societe Continentale et Maritime des Petroles, Compagnie Francais des Minerals d'Uranium, and others.
Principal officers: President, Henri Ziegler.
Interests and activities: The industrial exploitation of nuclear energy.
12. Name: SATNUC (Societe pour les Applications Techniques dans le Domaine de l'Energie Nucleaire).
Type: Company formed by a group of French chemical firms.
Principal officers: Director, T. Reis.
Interests and activities: To develop the applications of atomic energy in the chemical industry.
13. Name: SICN (La Societe Industrielle des Combustibles Nucleaires).
Type: Group of companies.
Principal officers: President, M. Bouly.
Interests and activities: Metallurgical problems.
14. Name: SODERN (Societe Anonyme d'Etudes et Realisations Nucleaires).
Type: Company.
Principal officers: Chairman and managing director, Louis Chove.
Interests and activities: To develop, manufacture, and sell electronic apparatus and equipment used in atomic power production.
15. Name: Electricité de France (EDF).
Location: 3 Rue Messine, Paris 8, France.
Type: Nationalized French electrical power industry.
Principal facilities: EDF–1, a 60-electical-megawatt natural uranium and graphite power reactor (critical 1959) EDF–2, a 100-electrical-megawatt reactor is planned for operation in 1960. Director general, Roger Gaspard.

2. Interests and activities

A. *Reactor program.*—(1) Name: Zoe (or EL–1). Location: Fontenay-aux-Roses Laboratory. Type: 150 kilowatts (heat), natural uranium, heavy water. Comments: Built in 1948 for 5 kilowatts; power raised in 1953 by providing D_2O coolant; used largely for the production of radioisotopes.
(2) Name: P–2 or EL–2. Location: Saclay. Type 2.5 megawatt (heat) natural uranium, heavy-water research reactor. Comments: Started for research.
(3) Name: EL–3. Location: Saclay. Type: 15 megawatts, Slightly enriched, heavy-water test reactor. Comments: Went critical July 1957; Uses D_2O (from United States) as coolant; exchanges heat with H_2O Graphite reflector and shielding is cooled by circulating air through enormous underground passageways. Water valves can isolate the building in case of release of radiation.
(4) Name: Proserpine. Location: Saclay. Type: 1-watt (heat) homogeneous plutonium research reactor. Comments: To come into operation during 1957.
(5) Name: Aquilon. Location: Saclay. Type: Critical assembly for lattice studies with water; 1 watt (heat). Comments: Came into operation in 1956.
(6) Name: Minerve. Location: Fontenay-aux-Roses Laboratory. Type: 100 watts (heat), a test pile (for determining purity of nuclear materials). Com-

ments: To be in operation in 1958, to be used for cross-section studies; ordinary water would serve as moderator. No coolant.

(7) Name: Trition. Location: Fontenay-aux-Roses Laboratory. Type: 1-megawatt (heat) swimming-pool research reactor. Comments: Under construction; to be in operation 1958.

(8) Name: Melusine. Location: Grenoble. Type: 1-megawatt (heat) swimming-pool reactor. Comments: Construction begun; to come into operation in 1958; to be used for shielding studies and training of students.

(9) Name: Pile Chaude. Location: Saclay. Type: Low; a high-temperature, gas-cooled research reactor. Comments: Under study by the Sacaly staff, in close cooperation with SNECMA (the French nationalized aviation industry).

(10) Name: The Q–2444 reactor. Location: —. Type: Prototype reactor for submarine propulsion, natural uranium. Comments: Under construction; scheduled to be in operation by about 1960; This reactor is being developed for installation in France's first nuclear-powered submarine (*Q–2444*), a 5,000-ton craft. The moderator and coolant would be pressurized heavy water; a school for atomic marine propulsion has been established at Cherbourg.

(11) Name: G–1. Location: Marcoule Laboratory. Type: 40-megawatt (heat) natural uranium and graphite. Comments: Air-cooled pile very similar to Brookhaven. First of a series of reactors built primarily for plutonium producation.

(12) Name: G–2 and G–3. Location: Marcoule Laboratory. Type: 150-megawatt (heat), 30-megawatt (electrical) natural uranium and graphite. Comments: G–2 to come into operation early 1958, G–3 6 months later; improved versions of G–1.

(13) Name: EDF–1. Location: Avoine, near Chinon. Type: 60 megawatt (electrical) natural uranium and graphite. Comments: To come into operation in 1959. France's first all-power nuclear plant. EDF–2 is planned to provide 100 megawatts power, come into operation in 1960.

B. *Other activities.*—Intense interest in the utilization of plutonium as fuel in reactors; present plans are for the construction by 1965 of a plutonium power breeder reactor. Also great interest in sodium-graphite and organic moderated types of reactors.

The French Parliament has approved expenditure of 25 billion francs for the construction of an isotope separation plant as a part of the next 5-year plan of the Commissariat.

III. UNITED STATES-FRENCH COOPERATION

1. Agreements for cooperation: A limited unclassified research and power agreement with France became effective on November 20, 1956.

An amendment, increasing the fuel transfer from 40 kilograms to 2,500 kilograms of U–235 became effective on August 19, 1957.

The 2,500 kilograms figure is based upon net consumption requirements for a 10-year period as follows:

(*a*) For use in research reactors.
(*b*) For use in test reactor (90 percent material).
(*c*) Prototype PWR (pressurized water reactor).
(*d*) 200-megawatt ship reactor.
(*e*) Light initial balances of enriched uranium for two EDF-type power reactors.
(*f*) 300-megawatt power reactor for EDF.

2. An atomic energy technical library was presented to France on April 15, 1955.

E. West Germany

I. ATOMIC ENERGY ORGANIZATION, ESTABLISHED JULY 1956

1. Name: Ministry of Atomic Energy—Bundesministerium für Atomsfragen.
2. Address: Luisenstrasse, Bonn, Germany.
3. Description: The responsibilities of the German Ministry are limited at present and it does not have full jurisdictional powers over all atomic energy matters in the Federal Republic. Its operating branch is divided into law and administration and international cooperation in Subdivision I, and research, economics, and technics in Subdivision II.
4. Officers: Prof. Dr. Ing. Siegfried Balke, Minister; R. R. Roth, Ministry Office Director; Min. Dirig. Dr. Cartelleri, Chief, Subdivision I; Dr. Schnurr, Chief, Subdivision II.

The German Atomic Energy Commission is a 27-member group of scientists, industrialists, bankers, etc., who advise the Ministry on a part-time basis about atomic energy policy, etc.

At present, the German Atomic Energy Organization is extremely complex, with the Government ministries, political parties, industrial groups, and even trade unions having atomic energy committees. Complete Government centralization is being avoided, to the extent where each of the Laender (States) in Germany (e. g. Bavaria) operates its own semiautonomous atomic energy program.

II. ATOMIC ENERGY INSTALLATIONS AND ACTIVITIES

1. Installations:

A. *Karlsruhe Research Center.*—The Physikalische Studiengesell-schaft GMBH is constructing a research reactor for this new center to be completed sometime in 1959. Industrial firms are cooperating on this venture which is being financed 50 percent by the Federal Government and 50 percent by 16 industrial firms. This will be the largest and most important nuclear research complex in Germany.

B. *Frankfurt Research Center.*—A small research reactor will be given to the new Institute for Nuclear Physics of the University of Frankfurt by Farbwerke Hoechst. Construction began January 1957.

C. *Technical University, Munich.*—Should get its swimming-pool type reactor in operation by October 1957. Installation will be by MAN (Maschinenfabrik Augsburg-Nuernberg).

D. *Hamburg—Study Corporation for the Application of Nuclear Energy to Ship Construction and Transportation.*—Is sponsoring a 5 million mark swimming-pool type reactor which is being supported financially by industry (33⅓ percent), the Federal Government (33⅓ percent) and the 4 German coastal states (33⅓ percent). Completion is expected by the end of 1957.

E. *Research Center, North Rhine-Westphalia.*—Is constructing an atomic research center which will eventually house several varied reactors of the research and materials testing variety. The center is not expected to be complete until about 1961.

F. *Max Planck Institute for Physics (Munich and Goettingen).*—Headquarters for this research organization will be moved to Munich where the referred to swimming-pool reactor is being constructed. Under the direction of Prof. Dr. Werner Heisenberg, leader and spokesman of German nuclear scientists, work is being done in areas of theoretical physics and chemistry. Recent projects include experiments connected with controlled thermonuclear reactions.

2. Interests and activities

A. *Research reactor program.*—

(1) Name: Munich Research Reactor at the Technical University of Munich. Type: 1 megawatt (heat). Moderately enriched uranium, light-water moderated and cooled. Date critical: October 1957. Comments: Contractor is AMF Atomics, Inc. (United States).

(2) Name: Hamburg Research Reactor in a suburb of Hamburg. Type: 1,000 kilowatts, moderately enriched uranium fueled, light-water moderated and cooled (swimming-pool type). Critical: End of 1957. Comments: Babcock & Wilcox Dampfkesselwerke A. G. (German) will install it. To be used in marine propulsion research.

(3) Name: Cologne Research Reactor at Cologne. Type: 1,000 kilowatts, moderately enriched uranium, light-water moderated and cooled, Merlin type (swimming-pool). Critical: Unannounced. Comments: Head Wrightson Processes Ltd. of England is the contractor.

(4) Cologne Materials Testing Reactor at Cologne. Type: Highly enriched uranium heavy-water moderated materials testing DIDO type. Critical: Unknown, still in planning stage. Comments: Contractor will be Head Wrightson Ltd. of England. To be used in connection with experiments in aircraft propulsion.

(5) Karlsruhe Research Reactor at Karlsruhe. Type: 10,000 kilowatts (heat), natural uranium, heavy-water moderated and cooled. Critical: 1959. Comments: Completely designed and built by Germans. Five engineers from England will act as advisers.

(6) Name: Frankfurt Research Reactor at Goethe University, Frankfurt. Type: 50 kilowatts, moderately enriched uranium, light-water moderated and cooled homogeneous type. Critical: October 1957. Comments: Contractor is Atomics International Division of North American Aviation (United States).

Other research reactors are being contemplated by the University of Mainz, and the Max Planck Institute for Physics in Munich. Details are unannounced.

B. *Power reactor program.*—

(1) The Rheinisch-Westfälische Elektrizitätswerke of Essen has awarded the contract for Germany's first power demonstration reactor to a combination of Siemens-Schuckert of Germany, AMF Atomics Inc. of United States, and Mitchell Engineering of England. It will probably be located at Dettingen near Aschaffenburg. Type: 15 megawatts (electrical) 50 megawatts (heat), boiling-water type. Critical: About September 1959.

(2) A group of utilities known as AVR (Arbeitsgemeinschaft Deutscher Energieversorgungsunternehmen zur Vorbereitung der Errichtung eines Leistungs Versuchsreaktors) is sponsoring a 15-megawatt (electric) quasi homogeneous gas-cooled, high-temperature reactor to be located in the area of Elektromark, Hagen. Critical: About 1961. Comments: To be built by Brown Boveri Cie (Germany).

(3) The same organization (AVR) is planning a similar type reactor (but 100-megawatt electric) to be built by Brown-Boveri Cie by 1963. Location unknown.

(4) Rheinisch Westfälische Elektrizitätswerk AG (RWE) is contracting with Siemens-Schuckert Werke to build a 100-megawatt (electric) combined-pressure and boiling-water reactor to be completed by 1960. Location unknown.

(5) The Gesellschaft für die Entwicklung der Atomkraft in Bayern m. b. H. (group of utilities near Munich) is planning a 100-megawatt (electric) plutonium storage reactor (plutonium spiked) to be completed by 1960. The Allgemeine Elektrizitäts-Gesellschaft (AEG) is the intended builder although the exact location for the project has not as yet been determined.

3. Other activities

The list of special facilities and activities of German organizations concerned with atomic energy is too extensive to include here. Among the chief interests are:

(*a*) An active electric power reactor program.

(*b*) Marine reactor propulsion applications.

(*c*) Research and development of isotope separation methods.

With regard to the latter Germany and the Netherlands are cooperating in research on the ultracentrifugation method of isotope separation under the overall direction of Dr. Groth and Professor Kistemaker.

Dr. Becker of Germany has patented a nozzle method of isotope separation in which the German firm Degussa is interested. (Degussa is trying to enlist the interest of other German firms to develop this process into a successful commercial venture.)

(*d*) Research and development on controlled thermonuclear reactions.

(Considerable interest is being evidenced in controlled thermonuclear research, and the Germans are proceeding, chiefly in the theoretical phases, at the Max Planck Institute in Goettingen and the Technical Universities in Munich and Hannover.)

(*e*) Finally, the Germans are very much interested in the technology and manufacture of reactor components, particularly for export.

III. UNITED STATES-GERMAN COOPERATION

1. Agreements for cooperation

A comprehensive research and power agreement with Germany came into effect on August 7, 1957, under the terms of which up to 2,500 kilograms net of U–235 contained in uranium may be transferred by the United States to Germany. The present agreement provides for sufficient U–235 to fuel the two RWE projects and the 15-megawatt (electric) AVR project outlined above. Fuel for the Frankfurt and Munich reactors has been transferred to Germany. Fuel for the Hamburg reactor will be transferred probably in the spring of 1958.

2. An atomic energy library

An atomic energy library was presented to West Germany on January 10, 1957.

F. The City of West Berlin

The Atomic Energy Act of 1954 was amended on April 12, 1957 (Public Law 14, 85th Cong., 1st sess.), to permit cooperation with the city of West Berlin. On August 1, 1957, the Government of the Federal Republic of Germany acting on behalf of Berlin and the United States exchanged notes bringing into effect a limited unclassified research bilateral agreement with Berlin.

I

The Berlin Atomic Energy Commission is a semiautonomous organization composed of 20 members from industry, government, and education. Some members of the Berlin AEC are as follows: Prof. Dr. Max Von Lane, Director Fritz Haber Institute; Senatsdirektor Busack; Senatsdirektor Dr. Gehlhoff; Regieurungsdirektor Dr. Wegner; Professor Dr. Ziemen, head of Berlin Nuclear Research Institute.

II. ATOMIC ENERGY INSTALLATIONS AND ACTIVITIES

The Berlin Nuclear Research Institute is importing a small research reactor in September 1957. It is being sponsored by the Berlin Senate associated with the Free University of Berlin and the Berlin Institute of Technology. (1) Name: Berlin Research Reactor, located in Berlin-Wannsee, a suburb of Berlin. (2) Type: 50–100 kilowatts, moderately enriched uranium, light-water moderated and cooled homogeneous type. (3) Critical: Spring, 1958. (4) Comments: Atomic International of North American Aviation is constructing this reactor.

III. AN ATOMIC ENERGY LIBRARY

An atomic energy library was approved for delivery to West Berlin on May 7, 1957.

G. Greece

I. ATOMIC ENERGY ORGANIZATION, ESTABLISHED FEBRUARY 1954

1. Name: National Atomic Energy Commission.
2. Address: 14 Patriarchea Joakim Street, Athens, Greece.
3. Description: 24-man Commission including members of the armed forces as well as civilian government officials. Meets once every month and receive no salary.
4. Officers: Rear Adm. Athanassios G. Spanides, Chairman (also Deputy Chief, National Defense General Staff); Prof. Th. Vlissidis, National University, Athens, Vice Chairman; Prof. Th. G. Kouyoumzelis, National University, Athens, Secretary General; Col. G. Papathanassiou, Special Secretary.

II. ATOMIC ENERGY INSTALLATIONS AND ACTIVITIES

1. Installations

Physicomathematic School of Athens University is presently conducting special courses in nuclear physics, particularly applied aspects thereof. Laboratory facilities are available, and diligent efforts are being made to educate a select cadre in anticipation of receiving the "Democritus research reactor" within a year. The reactor will be located at the base of Humettus Mountain near Aghia Parago. The Greek Atomic Energy Commission does not yet have research facilities of its own.

2. Interests and activities

A. *Reactor program.*—Name: "Democritus reactor." Type: 1 megawatt swimming-pool research-type reactor to be located in a suburb outside Athens. Date critical: Tentatively January 1958. Comments: Primary purpose will be the production of radioisotopes for biological and agricultural uses.

3. Other activities

While very much interested in beginning a nuclear power program, due to limited fuel resources, Greece will have great difficulty initiating anything but a very modest program, unless outside financial help is given.

III. UNITED STATES-GREEK COOPERATION

1. Agreements for cooperation: Standard unclassified research agreement with Greece became effective on August 4, 1955.
2. Sale of atomic-energy equipment or materials:
A. Reactors: Sale of swimming-pool reactor to Greece by AMF Atomics.
3. An atomic energy library was presented to Greece.
4. Interest has been expressed by the Greek Government in negotiating a power agreement, and a draft agreement has been given them for their consideration.

H. Italy

I. ATOMIC ENERGY ORGANIZATION

1. Name: National Committee for Nuclear Research (CNRN) Comitato Nazionale Per Le Richerche Nucleari.
2. Address: Piazzale delle Scienze 7, Rome, Italy.
3. Description: Established in 1952, this organization gives the practical effect to government policies by working through other semiindustrial, semipublic atomic energy institutions such as CISE and INFN mentioned below.
4. Officers: President, Senatore Professor Basilio Focaccia; Vice Presidents: Prof. Arnaldo M. Angelini, Prof. Eduardo Amaldi; General Secretary: Prof. Felice Ippolito.

II. RESEARCH INSTALLATIONS AND ACTIVITIES

1. The Center for Nuclear Information, Studies, and Experiments (CISE) is located in Milan. It is half private, half public supported, operating under the jurisdiction of CNRN (above) on industrial and applied aspects of nuclear research. Its major facility is located at Ispra where it will operate the CP–5 type reactor (Ispra I) for CNRN. This reactor is being built by American Car & Foundry Co. (United States) with Vitro Engineering (United States) acting as construction consultants. In addition to the reactor, the Ispra Research Center will have laboratories working in all physical sciences. The USAEC has been informed that a "gas diffusion" laboratory is working on problems of isotope separation and that a pilot diffusion plant has been planned under CISE auspices.
2. Research reactors: The Societa Richerche Inspianti Nucleari (SORIN) of Milan has arranged with the American Machine & Foundry Atomics Co. for the purchase of a 1-megawatt pool-type heterogeneous solid fuel research reactor. In addition, the following research reactors are being planned: A swimming-pool reactor by the University of Pisa jointly with the Naval Academy of Leghorn, a swimming-pool reactor by the University of Rome, a swimming-pool reactor by Fiat (automobile company) of Turin, and a 50-kilowatt water-boiler reactor by the Polytechnic School of Milan. The Universities of Bologna and Cagliari on Sarinia are planning installation of subcritical assemblies.
3. The National Institute of Nuclear Physics (INFN) is a fundamental nuclear research agency operating under the jurisdiction of CNRN. It's a major research facility being built at Frascati (the Frascati National Laboratory) where the 1-bevatron synchroton, Europe's largest, is under construction. INFN has its headquarters in Rome, and directs five sections in the Physics Institutes of Rome, Milan, Turin, Pisa, and Padua.

III. POWER REACTOR PROGRAM

1. Ente Nazionale Idrocarburi (ENI), the State Hydrocarbon Agency is a Government-owned trust company for the exploitation of sources of energy. It has direct or indirect control of the following organizations: Agip Nucleare, created in 1956, is a holding company and a direct subsidiary of ENI, created to explore all of the available possibilities of nuclear energy. Agip Nucleare in turn created SIMEA (Societa Italiana Meridionale Energia Atomica) a joint venture of Agip Nucleare (75 percent) and IRI, the Industrial Reconstruction Institute (25 percent), a state holding company.

(*a*) Agip Nucleare has announced its intention to purchase a Calder Hall type reactor from 1 of 4 English nuclear reactor firms. It will probably be located in north Italy.

(*b*) Simea has signed a letter of intent with the Vitro Corporation of America to supply engineering services for the construction of a 125-electrical-megawatt pressurized-water-type reactor to be built in southern Italy.

2. SELNI (Societa Ellectronucleare Italina) has signed a letter of intent to purchase a 147-electrical-megawatt pressurized-water reactor from Westinghouse (United States) to be constructed in north Italy. Comment: Negotiations are at a standstill pending resolvement of foreign exchange difficulties. SELNI is a nuclear energy company primarily controlled by the private Edison electric firm of Milan.
3. ACEA (the Rome communal water and power company) has declared its intent to purchase a 12.5-electrical-megawatt boiling-water-type reactor from the International General Electric Co. (United States).
4. SENN (Societa Ellettronucleare Nazionale), a combination 75 percent owned by Finelettrica, a public power organization, and 25 percent by a group

of utility manufacturing and iron and steel companies is negotiating with Babcock & Wilcox to furnish a heterogeneous pressurized-water reactor.

5. The Society for Research on Nuclear Installations (SORIN) project sponsored by the Montecatini and Fiat companies includes a 143-megawatt heterogeneous pressurized-water reactor to be furnished by Westinghouse (United States).

6. Other activities: A contract has been signed between Westinghouse and Fiat under which Fiat will manufacture and sell, under license, components for Westinghouse power reactors, and ultimately, entire reactors. Westinghouse will supply technical assistance and will provide training for Fiat engineers.

IV. UNITED STATES-ITALIAN COOPERATION

Agreements for cooperation: A comprehensive research and power agreement with Italy was signed on July 3, 1957, and is expected to come into force in October 1957, when the Italian Parliament reconvenes. The terms of the agreement allow for the transfer of up to 7,000 kilograms of U–235 contained in uranium. This amount is expected to cover the requirements for the two power projects listed above that materialize earliest as well as several of the research reactors listed.

An atomic energy technical library was presented to Italy on March 30, 1955.

I. Sweden

I. ATOMIC ENERGY ORGANIZATION: ESTABLISHED 1947

1. Swedish Atomic Energy Company (A B Atomenergi).

A. Address: Lovholmsvagen 5, Stockholm 9, Sweden.

B. Description: Joint venture of Government and private industry, Government owning 57 percent and private industry 43 percent of the shares. This organization is in charge of the applied and operational aspects of the Swedish atomic energy program.

C. Officers: Prof. Malte Jacobsson, Chairman; Dr. Harry Brynielsson, Managing Director; Mr. Sigvard Eklund, Dr. Rolf Pauli, assistants; Dr. G. Funke, Secretary General (Executive Officer).

2. The Atomic Committee (established 1945) is a governmentally appointed advisory body concentrating on the stimulation and development of fundamental nuclear research, etc. The Chairman is Malte Jacobsson and the Executive Officer is Mr. G. Funke.

3. State Atomic Energy Delegation, established in July 1956, to study developments in the atomic energy field. As an advisory organ it will formulate principles for atomic energy activities in relation to the general fuel and power supply situation in the country. The present members of this delegation are: G. S. E. Cederwall, Chairman; E. O. Grafstrom; T. Gustafson; T. K. A. Magusson; G. O. Oswald.

II. ATOMIC ENERGY INSTALLATIONS AND ACTIVITIES

1. Installations

A. A B Atomenergi is organized in three divisions: Physics, chemistry, industrial reactors. They have extensive laboratory facilities which include high temperature furnaces, several accelerators and a research center at Studsvik, 80 miles south of Stockholm, where the R2 reactor will be located.

B. Nobel Institute for Experimental Physics at Stockholm has several accelerators and isotope separators. Work is being performed on the study of structure and energy conditions of the atomic nucleons.

C. Stockholm University, the Royal Institute of Technology, the Institute of Nuclear Chemistry at Goteborg and Gustav Werner Institute of Nuclear Chemistry, all have varied amounts of research and development facilities.

2. Interests and activities (reactor program)

A. Name: R1 (Sleep) Swedish Low Energy Experimental pile located at Stockholm. Type: 100-kilowatt natural-uranium fueled, heavy-water moderated and cooled. Date critical: July 13, 1954. Comments: Uranium for this reactor was obtained from France, heavy water from Norway. Builder and operator: A B Atomenergi.

B. Name: R2, Swedish Experimental Reactor to be located at Studsvik. Type: 30-megowatt materials testing reactor. Date critical: About mid-1958. Comments: Will cost about $2 million and will be supplied by the American Car & Foundry Industries (United States).

C. R3 (no formal name yet). Type: 76 megowatts, natural uranium, heavy water. Date critical: 1960. Comments: To be used for central district heating. Will be built by A B Atomenergi in collaboration with the city of Stockholm for the suburb of Farsta.

D. Name: R4 (no name) Type: 100-megawatt power type, natural uranium, heavy water. Comment: Planning stage only.

3. Other activities:

A. The State Power Board has a Department of Atomic Energy and is contemplating a 75-megawatt heating station (Adam) for 1960 and another atomic plant (Eva) for 1963. Statistics unannounced.

B. Nuclear ship propulsion: The Swedish Shipbuilding Research Foundation and several large shipbuilding companies are engaging in research and observing the activities in this field in other countries.

C. ASEA (the largest electric utility company in Sweden): This company is extremely interested in, and plans, to produce heavy water in the near future. ASEA has also entered into a cooperative arrangement with Atomics International of Los Angeles to exchange information on reactors.

D. Raw materials: Sweden has abundant sources of alum and oil shales which are a source of low-grade usable uranium. It is estimated that 200–300 grams per metric ton of usable uranium could be extracted from the approximately 14 billion tons of alum and oil shales to be found in Narke, Vastergotland, and Ostergotland. Because of these resources Swedish efforts to date have concentrated on the use of natural uranium and heavy water, but considerable effort is being made toward the use of enriched uranium in view of the reduction in the price for enriched uranium announced by the United States last fall.

III. UNITED STATES-SWEDISH COOPERATION

A. *Agreements for cooperation.*—

1. Standard unclassified research agreement became effective January 18, 1956. An amendment increasing the fuel from 6 to 12 kilograms of U–235 became effective March 12, 1957.

2. A draft unclassified power agreement has been submitted to Sweden, and is presently under consideration by that country. Further negotiations in prospect for September 1957.

B. *Sale of atomic energy equipment or materials.*—

1. Reactors: Sale of research reactor to Sweden by American Car & Foundry Industries.

2. Heavy water: On December 18, 1956, the Commission approved the sale of 26 metric tons of heavy water (D_2O) to Sweden. This quantity is now in Sweden and is to be used in the R3 reactor.

C. *Library.*—An atomic energy technical library was presented to Sweden on April 19, 1955.

J. United Kingdom

I. ATOMIC ENERGY ORGANIZATION

A. *United Kingdom Atomic Energy Authority.*—Parliament, by an act of 1954, entrusted development of atomic energy in the United Kingdom to this body. The Lord President of the Council (Lord Home) is responsible for promoting and controlling the development of atomic energy and he appoints the members of the Authority.

1. Address: St. Giles Court, 1/13 St. Giles High Street London, W. C. 2

2. Officers: Chairman: Sir Edwin Plowden. Members: Sir John Cockcroft (member for scientific research) (member for engineering and production) (Note: This position, now vacant, was held by Sir Christopher Hinton, who recently resigned to become Chairman, United Kingdom Central Electricity Authority); Sir William Penney (member for weapons research and development); Sir Donald Perrott (member for finance and administration); Mr. William Strath (member for external relations and commercial policy). Part-time members: Sir Luke Fawcett; Sir Ivan Stedeford; Sir Rowland Smith; Mr. C. F. Kearton. Secretray Mr. D. E. H. Peirson.

II. AGREEMENT FOR COOPERATION

A. A power agreement with the United Kingdom became effective July 21, 1955. An amendment to this agreement became effective July 16, 1956, making possible cooperation on military reactors.

1. Activities under the agreement:

(*a*) Under the agreement for cooperation there have been exchanges of visitors, formal conferences, exchanges of scientific personnel and the establishment of standing committees for coordinating scientific activity of mutual interest. Some specific examples of activity under the agreement follow:

(1) Calder Hall reactor exchanges (gas-cooled, graphite moderated).
(2) Controlled thermonuclear reaction exchanges.
(3) Hot Loop Exchange (in-pile materials testing experiments).
(4) Nuclear cross-section data exchanges.
(5) Fast-neutron reactor exchanges. Detailed technological data are exchanged.
(6) Reactor and related instrumentation exchanges.
(7) General information exchange on specific power reactor concepts.

2. Cooperation under the amendment is confined at this time to nuclear-propelled submarines.

III. REACTOR PROGRAM

A. *Natural-uranium, gas-cooled reactor emphasis.*—Emphasis in the United Kingdom program is the natural uranium, gas-cooled, graphite-moderated reactor. The role of the UKAEA in the nuclear-power industry is the further development and refinement of this reactor concept for commercial exploitation, although research in other reactor systems is being done also. British authorities have decided that this reactor concept is the most feasible one upon which the British can develop much-needed electrical power through the use of nuclear energy.

B. *Magnitude of United Kingdom power program.*—In February 1955 the initial nuclear-power program was presented to Parliament calling for the installation of 1,500–2,000 megawatts of nuclear electrical generating capacity by 1965 at a cost of $840 million. The accomplishment of this goal would have meant a saving of 5 million to 6 million tons of coal per year. In March 1957 Parliament was informed that in the light of technical progress during the 2 preceding years the Government had decided to expand its original program and was now planning a program to achieve 5,000 to 6,000 megawatts of nuclear electrical capacity by 1965. The cost of this revised program would be $2,740 million and the coal savings would be 18 million tons annually. Even with this large program in nuclear energy British requirements would still call for an increase in the importation of oil over the next 10-year period to meet the increased demand for electric energy. This 6,000-megawatt program is expected to be installed in 16 to 19 power stations, each consisting of 2 nuclear reactors and the associated steam boilers and electrical generating equipment. Most of the stations will be of about 300 megawatts electrical capacity each, but it is expected that some of the later stations would be as much as 500 megawatts.

C. *Nuclear ship propulsion studies.*—Considerable effort is being made in exploring the possibilities of nuclear reactors for commercial and marine propulsion by a combined team of the British Shipbuilding Research Association and the Atomic Energy Authority. The pressurized-water reactor and organic moderated reactors are being studied in this connection. Construction of a prototype for submarine propulsion has already been started at Dounreay.

D. *Industrial participation.*—When the gas-cooled reactor showed promise for commercial power generation in the British economy, industry was encouraged to form consortia of individual companies which, together, would possess the industrial capacity and technical manpower to develop and manufacture power reactors of the gas-cooled, graphite moderated type. Five such consortia are now in existence:

1. A. E. I.—John Thompson Nuclear Energy Co., Ltd.: Associated Electrical Industries, Ltd.; John Thompson, Ltd.; Balfour, Beatty & Co., Ltd.; John Laing & Son, Ltd.

G. E. C. Simon-Carves Atomic Energy Group: General Electric Co., Ltd.; Simon-Carves, Ltd.; Motherwell Bridge and Engineering, Ltd.; John Mowlem (Scotland), Ltd.

The Nuclear Power Plant Co., Ltd.: C. A. Parsons and Co., Ltd.; A. Reyrolle & Co., Ltd.; Head, Wrightson & Co., Ltd.; Sir Robert McAlpine & Sons, Ltd.;

Whessoe, Ltd.; Strachan and Henshaw, Ltd.; Alex. Findlay & Co., Ltd.; Clarke, Chapman & Co., Ltd.; Parolle Electric Plant Co., Ltd.

English Electric-Babcock and Wilcox-Taylor Woodrow Group: The English Electric Co., Ltd.; Babcock & Wilcox, Ltd.; Taylor Woodrow, Ltd.

Atomic Power Constructions, Ltd.: Crompton Parkinson, Ltd.; International Combustion (Holdings), Ltd.; Richardsons, Westgarth & Co., Ltd.; Trollope & Colls, Ltd.; Holland & Hannen & Cubitts, Ltd.

E. *Reactor projects.*—

1. Calder Hall reactors (these reactors have dual purpose—plutonium production and electricity):

(*a*) A Station: First reactor began producing electricity in August 1956; second reactor began producing electricity in November 1956.

(*b*) B Station: First reactor will begin operation in 1958; second reactor, 1959.

2. Harwell: This is the location of the Atomic Energy Research Establishment. There are a number of research reactors in operation here, the names and types of which follow:

(*a*) Bepo: 6-megawatt natural uranium, graphite-moderated reactor, used to study effects of radiation on materials and components.

(*b*) Dido and Pluto: 20-percent enriched uranium, heavy-water moderated reactors, have neutron flux 50 times greater than Bepo and therefore permit more extensive tests than Bepo.

(*c*) Dimple, Zephyr, Zeus: Zero energy reactors, natural uranium, heavy-water moderated reactors, used to study general problems of reactor physics by observing component parts of a reactor system working together as a whole.

(*d*) Gleep: Natural uranium, graphite moderated reactor, used for general experimental purposes.

(*e*) Lido: Moderately enriched, light-water moderated, swimming-pool reactor, used primarily for shielding studies and particularly to assist in the development of the British submarine propulsion unit.

(*f*) Zetr: Zero energy, light or heavy water moderated zero energy reactor, used to study physics of homogeneous, aqueous systems.

(*g*) Nero: Zero energy, graphite moderated reactor, used for investigations for advanced graphite-moderated reactors.

3. Other research efforts: Research is also carried on extensively at several British universities with financial assistance from the Government's Department of Scientific and Industrial Research. Synchrotrons, cyclotrons, and linear electron accelerators are operating at various universities.

4. Other atomic energy facilities: The following is a list of other locations in the United Kingdom with atomic energy facilities, presently under construction or proposed, in addition to Calder Hall and Harwell:

(*a*) *Power stations and scheduled date of operation:*

(1) Berkeley (275-megowatt nuclear-power station): 1 reactor in 1960; 2 reactors in 1961.

(2) Bradwell (300-megawatt nuclear-power station): 1 reactor in 1960; 2 reactors in 1961.

(3) Chapelcross (184-megawatt nuclear-power reactors) for plutonium and electric production: 4 reactors in 1958–59.

(4) Dounreay (fast breeder experimental power reactor): Fall of 1958.

(5) Hinkley Point (275-megawatt nuclear-power station): 1 reactor in 1964–65.

(6) Hunterston (320-megawatt nuclear-power station): 2 reactors in 1961–62.

(7) Northern Ireland (150-megawatt nuclear-power station): 2 reactors in 1963–64.

Ten other reactors are being planned for completion by 1964–65.

(*b*) *Research and other establishments:*

(1) Aldermaston (experimental reactors), weapons research establishment.

(2) Capenhurst (diffusion plant for producing U–235).

(3) Culcheth (metallurgical research and development group).

(4) London (United Kingdom Atomic Energy Authority Headquarters).

(5) Risley (United Kingdom Atomic Energy Authority Industrial Group Hdqtrs).

(6) Springfields (Uranium and fuel element processing plant).

(7) Windscale (Plutonium factory).

(8) Winfrith Health (Reactor research establishment).

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